CARDIOVASCULAR REACTIVITY DURING STRESSFUL SOCIAL INTERACTION IN MEXICAN AMERICAN WOMEN: EFFECTS OF LANGUAGE AND INTERACTION PARTNER ETHNICITY

by

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STATEMENT OF DISSERTATION APPROVAL

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ABSTRACT

Acculturating to the United States confers risk for cardiovascular disease, possibly through cardiovascular reactivity (CVR) when communicating in a non-native language and interacting with individuals from a different ethnic background. Sixty-four women who immigrated to the United States from Mexico participated in the study. Cardiovascular responses were examined while participants communicated in both English and Spanish with a non-Hispanic White or Mexican American partner. Perceived discrimination, acculturation, task-related emotional responses, and perceptions of the interaction partner were also assessed. Speaking in English evoked greater increases in blood pressure and heart rate than communicating in Spanish and larger increases in negative affect. English - speaking interaction partners were also viewed as less friendly and more dominant. Perceived discrimination and levels of acculturation did not predict CVR. These findings suggest that health effects of acculturation for Mexican Americans may involve the cardiovascular stress responses associated with communicating in a non-native language.

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CHAPTER 1

INTRODUCTION

Overview

Despite advances in treatment, cardiovascular disease (CVD) remains the leading cause of death in the United States (Lloyd-Jones et al., 2010). Rates of CVD in the United States vary across ethnic and racial groups (Lloyd-Jones et al., 2010; Whitfield, Weidner, Clark, & Anderson, 2002). Hispanics represent the largest racial/ethnic minority group in the United States, with Hispanics of Mexican descent by far the largest subgroup. Further, the percentage of Hispanics of Mexican descent in the United States population is expected to increase substantially over the next several decades, largely through immigration (Passel & Cohn, 2008). Hence, the prevalence of CVD and related psychosocial risk factors among Mexican Americans are a key topic for research. Further, because multiple aspects of CVD and related risk factors differ between men and women (Low, Thurston, & Matthews, 2010; Shaw, Bugiardini, & Merz, 2009), risk processes among Mexican American women are an important but understudied topic.

The present study examined influences on cardiovascular reactivity (CVR) among Mexican American women. Heightened CVR is a widely studied mechanism linking psychosocial risk factors with CVD (Chida & Steptoe, 2010; Schwartz et al., 2003), and specifically refers to increases in heart rate and blood pressure in response to stressors.

Ethnic minority status and the process of immigration are replete with potential stressors for Mexican Americans (Gallo, Penedo, Espinosa de los Monteros, & Arguelles, 2009; Ruiz & Steffen, 2011), and CVR has been examined specifically as a mechanism linking related processes (e.g., ethnic and racial discrimination) with CVD risk (Brondolo, Gallo, & Myers, 2009; Myers, 2009; Williams & Mohammed, 2009). Many aspects of the day to day experience of Mexican Americans could be associated with heightened CVR, and hence could contribute to elevated risk for CVD. Here we examine language used during social interactions, ethnicity of interaction partners, and individual differences in acculturation and prior experiences of discrimination as potentially important elements of the social psychophysiology of CVR (Smith & Gerin, 1998) among Mexican American women.

Background

Ethnicity, Acculturation and CVD among Hispanics

Evidence regarding the prevalence of CVD generally and coronary heart disease (CHD) in particular among Mexican Americans relative to non-Hispanic Whites has been inconsistent. Some evidence suggests that despite serious socioeconomic disadvantages that generally confer greater risk of CVD and earlier mortality, Hispanics display lower rates of morbidity and mortality than do non-Hispanic Whites, a pattern labeled the *Hispanic paradox* (see Ruiz & Steffen, 2011, for a review). In contrast, other studies suggest greater risk of CVD and CHD among Mexican American women compared to their non-Hispanic White counterparts (Hunt et al., 2003; Mitchell, Hazuda, Haffner, Patterson, & Stern, 1991; Pandey, Labarthe, Goff, Chan, & Nichaman, 2001).

Despite this mixed evidence, acculturation to the mainstream culture among Hispanics in the United States is more consistently associated with increased CVD and CHD risk (for reviews, see Gallo, Penedo, et al., 2009; Ruiz & Steffen, 2011). Substantial evidence indicates that CVD risk increases generally with acculturation to industrialized western nations (Lorenzo et al., 2005; Singh & Siahpush, 2002; Stern & Wei, 1999). For example, as Mexican Americans become increasingly acculturated to the United States their prevalence of hypertension increases (Espino & Maldonado, 1990). This finding has been replicated across ethnic groups immigrating from Africa, Asia, and Latin America (Cooper et al., 1997; Lorenzo et al., 2005; Marmot, 1983; Wilson, Hollifield, & Grim, 1991). A recent meta-analysis conducted by Steffen and colleagues (2006) suggests that acculturation to industrialized western nations is strongly associated with high blood pressure, and the magnitude of the effect for acculturation corresponds to other well-established risk factors for high blood pressure (e.g., body weight, level of physical activity, work related stress). Similar effects of acculturation on subclinical atherosclerosis have been found among Hispanics generally (Diez-Roux et al., 2005; Lutsey et al., 2008) and among Mexican Americans in particular (Gallo, Espinosa de los Monteros, et al., 2009). These effects of acculturation on CVD and CHD risk among Mexican Americans are especially important in light of recent and future trends in immigration found in the United States (Ruiz & Steffen, 2011).

Although many definitions of acculturation have been proposed, Berry's (1980; 2003) two-dimensional model has been the most widely accepted. In this view, acculturation is conceptualized as reflecting two factors - maintenance of the original cultural heritage and identity and participation in larger mainstream society. Based upon

this model individuals can be placed in four categories. Those who do not maintain their original ethnic cultural identity but seek participation within the mainstream society are categorized as pursuing an *assimilation* strategy. The *separation* strategy involves maintenance of the original ethnic and cultural identity, while limiting participation within the larger mainstream society. *Integration* involves attempts to maintain and balance the original ethnic and cultural identity with participation in larger mainstream society. Finally, individuals with limited interest in maintaining their original cultural identity and in participating in mainstream society are adopting a *marginalization* strategy. For positive adaptation, integration is usually the most successful, marginalization strategies the least, and assimilation/separation strategies moderately successful (Berry, 2006).

Mechanisms Linking Acculturation and CVD Risk

While changes in behavioral risk factors (e.g., diet, activity level, and smoking) likely contribute to increasing CVD risk with acculturation (Kurian & Cardarelli, 2007; Sundquist & Winkleby, 1999; Winkleby, Kraemer, Ahn, & Varady, 1998), some studies suggest that stress associated with the acculturative process plays an independent and perhaps even larger role. Acculturation is associated with higher blood pressure even when negative health behaviors are controlled (Marmot & Syme, 1976; Waldron et al., 1982). Changes in diet and health behaviors predict CVD risk within ethnic groups, but do not fully account for differences in risk between these groups (Forouhi & Sattar, 2006). Also, the largest impact of acculturation on blood pressure happens within the first few years of contact with a new culture and this finding was not related to body mass

index or cholesterol (Steffen et al., 2006), suggesting that other psychosocial mechanisms may be involved. For example, to the extent that acculturation among Mexican Americans involves moving away from otherwise beneficial traditional cultural values that emphasize positive social connections and relationships within and beyond the family (e.g., *familismo*, *personalismo*, *simpatia*), this process may undermine important stress buffers and leave the individual more vulnerable to the stresses of ethnic minority status (Gallo, Penedo, et al., 2009; Ruiz & Steffen, 2011).

In explaining racial and ethnic disparities in CVD and CHD generally, as well as the effects of acculturation, exposure to the stress of racial and ethnic discrimination has been described as a potentially important factor (Brondolo et al., 2009; Myers, 2009; Nazroo, 2003; Williams & Mohammed, 2009). Increasing levels of acculturation among immigrants is associated with greater exposure to ethnic or racial discrimination (Finch, Kolody, & Vega, 2000). Chronic stress associated with such discrimination is believed to promote CVD through the cumulative effective of chronic physiological activation, including heightened CVR. Studies examining the association between ethnic discrimination and CVD risk factors, such as resting blood pressure, have been mixed and primarily conducted with African Americans (Brondolo, Rieppi, Kelly, & Gerin, 2003; Harrell, Hall, & Taliaferro, 2003). These studies have reported expected positive associations (Din-Dzietham, Nembhard, Collins, & Davis, 2004), curvilinear associations between discrimination and resting blood pressure (Ryan, Gee, & Laflamme, 2006), no association (Brown, Matthews, Bromberger, & Chang, 2006; Peters, 2006), or even inverse associations (Krieger & Sidney, 1996).

In contrast to findings regarding resting blood pressure, evidence linking perceived discrimination to laboratory induced cardiovascular reactivity (CVR) has been more consistent. As noted previously, the reactivity hypothesis (Chida & Steptoe, 2010; Schwartz et al., 2003) suggests that larger, more frequent, and persistent increases in blood pressure and heart rate in response to psychological stress can contribute to hypertension, atherosclerosis, and the precipitation of acute cardiovascular events. Exposure to laboratory analogues of potentially discriminatory and provocative social situations and stimuli evoke substantial levels of CVR, and higher levels of prior experience with ethnic discrimination have also been associated with greater levels of CVR (e.g., Clark, 2006; Merritt, Bennett, Williams, Edwards, & Sollers, 2006; Richman, Bennett, Pek, Siegler, & Williams, 2007). For example, Guyll, Matthews, and Bromberger (2001) found that among African American participants, individuals who attributed subtle mistreatment to ethnic discrimination displayed greater CVR during a laboratory speech task. However, the very few studies among Hispanics have not found the expected positive association between reports of ethnic discrimination and CVR (Salomon & Jagusztyn, 2008).

Ethnicity, Language Use, and the Social Psychophysiology of CVR

The effects of acculturation on CVD risk could also reflect other factors that influence CVR during daily experience among Mexican Americans. For example, acculturation involves interethnicity social interaction, in the form of increased contact with individuals of the majority ethnic population. Interactions with individuals of a different ethnicity are often stressful (for a review, see Trawalter, Richeson, & Shelton,

2009). However, the effects of social interactions with non-Hispanic Whites on CVR among Mexican Americans have not been examined previously. To the extent that interactions with non-Hispanic Whites are experienced as threatening or difficult for Mexican Americans, these social interactions should evoke greater CVR than interactions with other Mexican Americans (Mendes, Blascovich, Lickel, & Hunter, 2002; Wright, Tunstall, Williams, Goodwin, & Harmon-Jones, 1995). Further, to the extent that non-Hispanic White interaction partners are perceived by Mexican Americans as higher in status than other Mexican Americans (Anderson, 1989), this feature of interethnicity interaction could also evoke heightened CVR (Mendes, Blascovich, Major, & Seery, 2001; Smith, Cundiff, & Uchino, 2012).

For recent immigrants from Mexico to the United States, acculturation also involves the potentially stressful task of learning and utilizing a new language. Previous research suggests that English competency or comfortableness communicating in English is a salient stressor for Mexican Americans immigrating to the United States (Salgado de Snyder, 1987). As in the case of interethnicity interaction, to the extent that communicating in a second language poses a threat or difficult challenge (Blascovich & Tomaka, 1996; Wright et al., 1995) native Spanish-speaking Mexican Americans would likely display greater CVR when interacting in English than in their native Spanish. Beyond simply increasing task difficulty, communicating in a less proficient language native Spanish-speaking Mexican Americans may feel that they are unable to communicate clearly, likely resulting in increased self-evaluation (MacIntyre, Noela, & Clement, 1997). The resulting increased levels of self-evaluation (Lyons, Spicer, Tuffin,

& Chamberlain, 2000) and evaluative threat would also heighten CVR (Smith, Nealey, Kircher, & Limon, 1997; Wright et al., 1995).

To the extent that social interactions with other ethnic groups and communicating in a second language evoke heightened CVR for Mexican Americans, these common aspects of acculturation could contribute to increased risk for CVD. Further, prior experiences with discrimination could moderate the effects of language use and the ethnicity of interaction partners on CVR. For example, heightened CVR when interacting with persons of a different ethnic background might be particularly evident among Mexican Americans who report high levels of prior discrimination, given that these factors could heighten perceived threat.

The Present Study

To examine these potential influences on CVR, native Spanish speaking Mexican American women responded to a role-played social interaction involving stressful situations that could been seen as involving discrimination (i.e., an accusation of shoplifting, a conflict over a minor auto accident). Individual differences in acculturation and prior experiences of ethnic discrimination were measured and used as predictors of the magnitude of CVR in response to these stressors. For acculturation, involvement in both the culture of origin and the new culture was examined. Further, given the mixed findings of prior research, both linear and curvilinear effects of discrimination and acculturation were examined.

In the social interaction tasks, participants interacted with video-recorded partners who were either non-Hispanic White or Mexican American. Further, all participants

engaged in two social interactions, one in Spanish and one in English, in a counter-balanced order. As described previously, we predicted that CVR would be greater when participants interacted with non-Hispanic Whites as opposed to other Mexican Americans, and when they interacted in English as opposed to Spanish. Finally, we also examined discrimination and acculturation as linear and curvilinear moderators of these effects of partner ethnicity and language.

CHAPTER 2

METHOD

Participants

Mexican American women were recruited from the general Salt Lake City area, through English Second Language (ESL) classrooms, in order to enroll individuals who were actively engaged in the acculturation process and able to complete the interaction task in both Spanish and English. The 64 participants ranged in age from 18 to 30 (M = 25.34, SD = 3.90), and were paid $35. All participants were native Spanish speakers and immigrants to the United States, with no previous history of CVD. Procedures were approved by University of Utah IRB.

Design

Target Ethnicity (i.e., Non-Hispanic White vs. Mexican American) and Language (i.e., Spanish vs. English) were manipulated in a randomized, mixed design. In the repeated or within-participants factor, all participants interacted with female video-recorded partners in both English and Spanish, in a counter-balanced order. In the between-participants factor, half of the participants interacted with Mexican American video-recorded targets in both tasks, whereas the other participants interacted with two

non-Hispanic White targets. Two non-Hispanic White women and two Mexican American women served as the targets in the video-recorded presentation in the interaction tasks. Each of these four women recorded Spanish and English versions of the target's portion of two interaction tasks, which also varied in regards to the specific task topic. In one task topic, the target played the role of a store security guard and accused the participant of shoplifting. In the other, the target played the role of a passenger in another automobile and accused the participant of causing a minor accident in a parking lot. These 16 versions of the task (i.e., 4 targets x 2 languages x 2 task topics) were fully counterbalanced in the randomized design. That is, participants were randomly assigned to 1 of 16 different conditions, which fully counter-balanced the specific individual (i.e., four possible targets) on the video first observed, the language of the first interaction, the ethnicity of the target, and the specific content of the first task (i.e., shoplifting vs. auto accident). Thus, individuals responded to two targets about two scenarios. They were randomly assigned to communicate with someone of the same or different ethnicity during both tasks, and to communicate first in either English or Spanish. In addition, participants were randomly assigned to interact first in a speech task regarding a minor auto accident or defend themselves in an accusation of shoplifting.

Measures

Standardized questionnaires were used to assess individual differences in acculturation and discrimination, emotional responses to the interaction task, and perceptions of the video-recorded interaction task partner. Questionnaires that were not available initially in Spanish were forward and back translated by professional bilingual

translators. Participants were allowed to complete questionnaires in their preferred language.

The Acculturation Rating Scale for Mexican Americans-II (ARSMA-II)

The ARSMA-II was used to assess participant's level of acculturation (Cuéllar, Arnold, & Maldonado, 1995). The ARSMA-II has been shown to be both a reliable and valid measure of acculturation specific to the Mexican American experience. The ARSMA-II is a two-part questionnaire assessing Berry's (1980) four typologies of acculturation adaptation (i.e., assimilation, integration, separation, and marginalization) through measurement of attitudes and behaviors toward the culture of origin (Mexican American culture) and the host culture (United States culture) (Zane & Mak, 2003). Part one consists of 30 items measuring individual's extent of involvement in Mexican and Anglo-American culture by assessing cultural practices, language proficiency and preferences, social affiliation, and ethnic identification. From these 30 items two subscales are created involving items related to involvement in Mexican culture (the Mexican Orientation Subscale – Cronbach's $\alpha = .65$ in the current sample) and items related to involvement with Anglo-American culture (the Anglo Orientation Subscale – Cronbach's $\alpha = .88$ in the current sample). A combined score from these factors is then obtained by subtracting the Mexican Orientation Subscale from the Anglo Orientation Subscale. In prior research internal consistency reports of the various subscales ranged from .68 to .91 with 1-week test re-test reliability ranging from .72 to .96 (Cuéllar et al., 1995). Part two consists of 18 items forming three subscales that measure the respondent's acceptance and behaviors within the Mexican culture (Mexican marginality

subscale), the Mexican American culture (Mexican American marginality subscale), and the Anglo culture (Anglo marginality subscale). Given prior evidence of poor psychometric characteristics for these marginality scales (Del Pilar & Udasco, 2004; Gutierrez, Franco, Powell, Peterson, & Reid, 2009), only the Mexican Orientation Subscale, the Anglo Orientation Subscale, and their composite score, were utilized in the subsequent analyses.

The Perceived Ethnic Discrimination Questionnaire

Community Version (PEDQ-CV)

The PEDQ-CV, was used to assess perceived racism and/or ethnic discrimination (Brondolo et al., 2005). This questionnaire provides information regarding different forms of ethnic-related interpersonal stressors that are likely to be pertinent to the Mexican American experience. The PEDQ-CV is a 62 item scale with five major sub-scales - Lifetime Discrimination, Discrimination in the Media, Discrimination against Family Members, Discrimination in Different Settings, and Past Week Discrimination. In the current sample, internal consistency ranged from .84 to .99 for the five scales. In addition, the PEDQ-CV has also demonstrated good convergent and discriminant validity with other discrimination-related measures (Brondolo et al., 2005). Consistent with previous investigations, the perceived lifetime discrimination scale was utilized in the analyses (Brondolo et al., 2008).

State Anxiety and Anger

As a check on the stressfulness of the interaction task, measurements of state anxiety and anger were taken after each baseline and task period. Participants completed a 12-item state affect measure, asking how participants felt at that moment. The questionnaire consists of ten items taken from the State Anxiety Scale and the State Anger Scale of the State-Trait Personality Inventory (Spielberger, 1980) and two inversely worded items developed by Smith, Ruiz, and Uchino (2004). Alpha coefficients for this questionnaire ranged from .69 during baseline measurement to .83 during speaking tasks (c.f., Smith et al., 2004). Prior studies demonstrate construct validity in the form of expected responses to experimental manipulations (Nealey-Moore et al., 2007; Smith et al., 2004).

Impact Message Inventory – Circumplex (IMI-C)

As an assessment of perceptions of the target in both interaction tasks, participants completed a 32-item version of the IMI-C (Kiesler, Schmidt, & Wagner, 1997; Nealey-Moore et al., 2007). Specifically, participants rated their video-recorded target (i.e., interaction partner) during the interaction tasks. Scores quantify the dimensions of affiliation (i.e., friendliness vs. hostility) and control (i.e., dominance vs. submissiveness). Several studies support the reliability and validity of the IMI-C control and affiliation scales (e.g., Nealey-Moore et al., 2007; Smith et al., 2004). These two interpersonal dimensions are useful in characterizing social influences on CVR (Smith, Gallo, & Ruiz, 2003).

Additional Questionnaire Items

After both tasks, four single-item measures assessed participant experiences of threat (How threatened did you feel during the last task?), challenge (How able were to cope with the last task?), difficulty (How difficult was the last task?), and task importance (How important was the last task to you?). A composite score of cognitive appraisals of threat versus challenge was made by subtracting challenge scores (e.g., ability to cope with the task) from threat scores (Tomaka, Blascovich, Kelsey, & Leitten, 1993). Two additional questions were added to assess participants' appraisals of similarity (i.e., "They are similar to me") and perceived ethnic background (i.e., "They are of Mexican heritage").

Physiological Measures

A Dinamap Model 8100 (Critikon, Tampa, FL) oscillometric monitor will be used to assess systolic blood pressure (SBP), diastolic blood pressure (DBP), and heart rate (HR).

Procedure

After completing informed consent forms, participants were seated for a baseline period. A blood pressure cuff was placed on their nondominant arm to record SBP, DBP, and HR. After a 12-minute baseline, they communicated in either English or Spanish with either a non-Hispanic White or Mexican American target during the first of two stressful interaction tasks, as described below. Participants then sat quietly for a second 12-minute baseline. They then communicated with a different target that was the same

ethnicity as the target during the first task, but in the language that was not used in the first task. Further, they discussed the topic (i.e., shoplifting or auto accident) that was not used during the first task. The two stressful speaking tasks were intended to be analogues of ambiguous social situations, which have been previously reported as the likely areas of perceived discrimination (Brondolo et al., 2003). State affect measures were completed at the end of the first baseline period, at the end of the first speaking task, at the end of the second baseline period, and at the end of the second speaking task. IMI ratings of target control and affiliation were completed at the conclusion of both tasks, as were additional questionnaire items described previously. Blood pressure and heart rate data were collected throughout the experiment. At the conclusion of the procedure, measures of past discrimination and acculturation were completed and participants were then debriefed.

Description of Speech Tasks and Reduction of Physiological Measures

One speech task involved an interaction regarding a minor auto accident in a parking lot. The target played the role of a passenger in the other auto, and accused the participant/driver of causing the accident and being responsible for the damage. The other task involved an interaction with a store security guard who wrongfully accuses the participant of shoplifting a small store item (i.e., a DVD). The videos were developed utilizing four experienced actresses. To ensure similarity across targets and languages, scripts were created in English and then forward and backward translated. The actresses were then provided a script for each scenario. Creation of the videos was observed by the primary investigator to promote uniformity. In addition, a target video used in a previous

similar study was shown to each actress to provide a model for the video taped interaction.

Prior to both tasks, participants were provided with a brief written description of the incident, and they were asked to review the information for 1 minute. They then watched for 2 minutes as the interaction target presenting their initial description of the incident. Participants then responded, speaking for 3 minutes. Participants then watched another 2 minute video segment in which the target spoke again, and then responded for a second 3 minute period. The second task had an identical format. Participants were told that their responses were video-recorded throughout both speech tasks.

Three measurements of SBP, DBP, and HR taken during the final 3 minutes of the pretask baseline were averaged to form a baseline value. Two measures taken during both listening portions of the task were averaged for a listening average value, and two measures were taken during both speaking portions of the task were similarly averaged. Listening minus baseline and speaking minus baseline change scores (Llabre, Spitzer, Saab, Ironson, & Schneiderman, 1991) were calculated separately for both tasks.

CHAPTER 3

RESULTS

Overview of Analyses

The framework for the analyses was a 2 (Language: English vs. Spanish) x 2 (Target Ethnicity: Non-Hispanic White or Mexican American) mixed ANOVA. In the analyses of change scores for SBP, DBP, and HR, an additional repeated factor was included in the design – Activity (Speaking vs. Listening). Similar Target Ethnicity x Language analyses were conducted on task minus baseline changes in state anxiety and anger, appraisal's of the Target's control and affiliation during the task, and additional task appraisals (i.e., challenge, threat, difficulty, and importance). Additional regression analyses examined the effects of acculturation and discrimination on each of the dependent variables. Specifically, the linear and curvilinear effects of continuous discrimination and acculturation scores were used in regression analyses of task changes in SBP, DBP, HR, anxiety, and anger, as well as ratings of the target's affiliation and control. Main effects on task averages were examined, as well as interactions of discrimination and acculturation with Target Ethnicity, and effects within Spanish and English language tasks.

Cardiovascular Reactivity

Systolic Blood Pressure

Overall, participants displayed an increase from baseline of 17.0 mmHg in SBP during the task, $F(1,61) = 301.4$, $p < .001$, $\eta^2 = .83$. As predicted, participants displayed larger increases in SBP when communicating in English as compared to Spanish (M = 18.7 mmHg vs. 15.4 mm Hg; SE = 1.13, 0.97), $F(1,61) = 18.43$, $p < .001$, $\eta^2 = .23$. However, the main effect of target ethnicity did not approach significance, $F(1,61) = 0.53$, $p = .47$, $\eta^2 = .01$, nor did the interaction between language used and target ethnicity, $F(1,61) = 0.01$, $p = .95$, $\eta^2 < .01$. As expected, participants displayed greater SBP reactivity while speaking (21.2 mmHg, SE = 1.21) than listening to the target (12.8 mmHg, SE = 0.90), $F(1,61) = 104.3$, $p < .001$, $\eta^2 = .63$. As depicted in Figure 1, participants displayed greater SBP reactivity when communicating in English than in Spanish, both while they spoke, $F(1,61) = 13.14$, $p = .001$, $\eta^2 = .18$, and while they listened to the target, $F(1,61) = 15.14$, $p < .001$, $\eta^2 = .20$. No other effects in the Language x Target Ethnicity x Activity mixed ANOVA of SBP reactivity were significant.

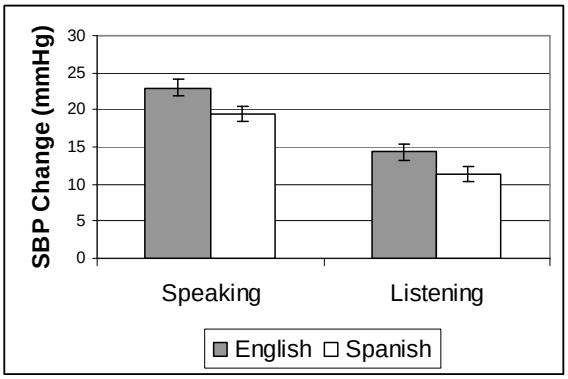

Figure 1. Systolic Blood Pressure (SBP) Reactivity

Diastolic Blood Pressure

Overall, participants displayed an increase from baseline of 10.1 mmHg in DBP during the task, $F(1,61) = 325.7$, $p < .001$, $\eta^2 = .84$. As predicted, participants displayed larger increases in DBP when communicating in English as compared to Spanish (M = 11.1 mmHg vs. 9.6 mmHg; SE = 0.68, 0.58), $F(1,61) = 7.65$, $p = .007$, $\eta^2 = .11$. However, the main effect of target ethnicity did not approach significance, $F(1,61) = 0.84$, $p = .36$, $\eta^2 = .014$, nor did the interaction between language used and target ethnicity, $F(1,61) = 0.07$, $p = .79$, $\eta^2 < .01$. As expected, participants displayed greater DBP reactivity while speaking (13.3 mmHg, SE = 0.75) than listening to the target (9.6 mmHg, SE = 0.58), $F(1,61) = 82.7$, $p < .001$, $\eta^2 = .58$. As depicted in Figure 2, participants displayed greater DBP reactivity when communicating in English than in Spanish, both while they spoke, $F(1,61) = 8.86$, $p = .004$, $\eta^2 = .13$, and while they listened to the target, $F(1,61) = 4.11$ $p = .047$, $\eta^2 = .063$. No other effects in the Language x Target Ethnicity x Activity mixed ANOVA of DBP reactivity were significant.

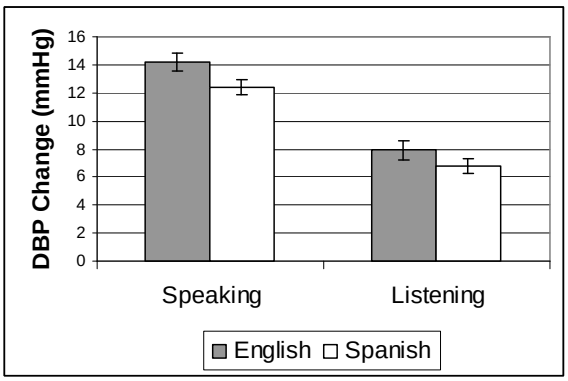

Figure 2. Diastolic Blood Pressure (DBP) Reactivity

Heart Rate

Overall, participants displayed an increase from baseline in HR of 12.9 beats per minute (bpm) during the task, $F(1,61) = 109.8$, $p < .001$, $\eta^2 = .64$. As predicted, participants displayed larger increases in HR when communicating in English as compared to Spanish (M = 14.3 bpm vs. 11.5 bpm, SE = 1.44, 1.19), $F(1,61) = 8.14$, $p = .006$, $\eta^2 = .12$. However, the main effect of target ethnicity did not approach significance, $F(1,61) = 0.30$, $p = .59$, $\eta^2 = .004$, nor did the interaction between language used and target ethnicity, $F(1,61) = 0.072$, $p = .79$, $\eta^2 = .001$. As expected, participants displayed greater HR reactivity while speaking (17.0 bpm, SE = 1.40) than listening to the target (8.8 bpm, SE = 1.19), $F(1,61) = 99.8$, $p < .001$, $\eta^2 = .62$. As depicted in Figure 3, participants displayed greater HR reactivity when communicating in English than in Spanish, both while they spoke, $F(1,61) = 11.5$, $p = .001$, $\eta^2 = .16$, and while they listened to the target, $F(1,61) = 4.21$ $p = .044$, $\eta^2 = .065$. No other effects in the Language x Target Ethnicity x Activity mixed ANOVA of HR reactivity were significant.

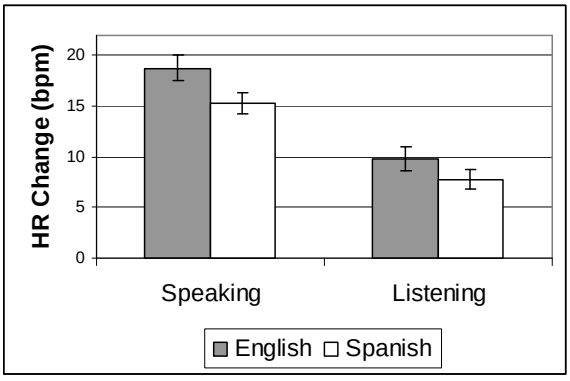

Figure 3. Heart Rate (HR) Reactivity

Negative Affect during the Task and Appraisals of Target

Anxiety and Anger

Overall, participants displayed a significant increase from baseline in self-reported anxiety, $F(1,62) = 149.47$, $p < .001$, $\eta^2 = .707$. As predicted, participants displayed larger increases in anxiety when communicating in English as compared to Spanish, as displayed in Figure 4, $F(1,62) = 22.45$, $p < .001$, $\eta^2 = .266$. However, the main effect of target ethnicity did not approach significance, $F(1,62) = 2.22$, $p = .141$, $\eta^2 = .035$, nor did the interaction between language and target ethnicity, $F(1,62) = .10$, $p = .750$, $\eta^2 = .002$.

Overall, participants displayed a significant increase from baseline in self-reported anger, $F(1,61) = 97.08$, $p < .001$, $\eta^2 = .614$. As predicted, participants displayed larger increases in anger when communicating in English as compared to Spanish, as displayed in Figure 4, $F(1,61) = 11.16$, $p = .001$, $\eta^2 = .155$. However, the main effect of target ethnicity did not approach significance, $F(1,61) = .115$, $p = .735$, $\eta^2 = .002$, nor did the interaction between language and target ethnicity, $F(1,61) = .361$, $p = .550$, $\eta^2 = .006$.

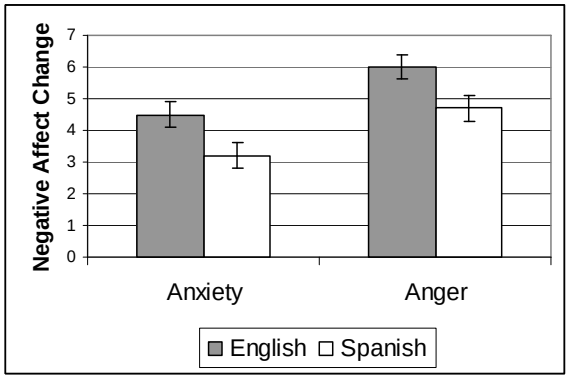

Figure 4. Negative Affect Change

Appraisals of Target Affiliation and Dominance

Overall, participants rated the interaction targets as clearly in the unfriendly portion of the affiliation dimension of the interpersonal circumplex, $F(1,61) = 835.33$, $p < .001$, $\eta^2 = .932$. Consistent with predictions, when communicating in English participants rated the target lower affiliation (i.e., more hostile) than when communicating in Spanish ($M = -2.85$ vs. -2.54, $SE = .106, .109$, respectively), $F(1,61) = 8.01$, $p = .006$, $\eta^2 = .116$. This main effect for language was qualified by a significant Language by Target Ethnicity interaction, $F(1,61) = 5.65$, $p = .021$, $\eta^2 = .085$. As depicted in Figure 5, participants viewed Mexican American English speaking interaction targets as significantly lower in affiliation (i.e., more hostile) than the other three types of targets, which did not differ from each other.

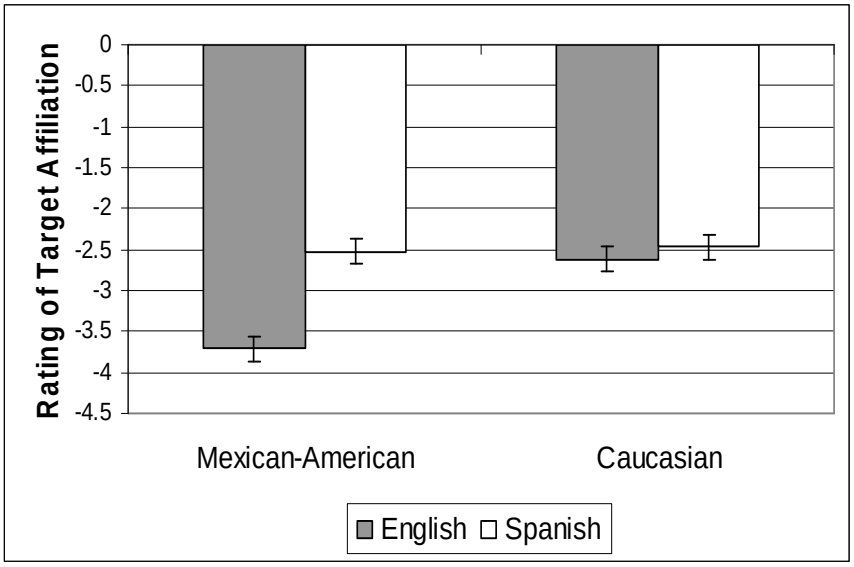

Figure 5. Rating of Target Affiliation

Overall, participants rated the interaction targets as clearly in the dominant portion of the control dimension of the interpersonal circumplex, $F(1,61) = 783.53$, $p < .001$, $\eta^2 = .928$. As predicted, participants rated interaction targets as more dominant during English speaking tasks as opposed to Spanish speaking interactions ($M = 2.38$ vs. 1.90, $SE = .117, .129$, respectively), $F(1,61) = 6.19$, $p = .016$, $\eta^2 = .092$. There was no observed main effect for ethnicity $F(1.61) = .91$, $p = .343$, $\eta^2 = .015$. As presented in Figure 6, the interaction between Language and Target Ethnicity approached significance, $F(1,61) = 2.97$, $p = .090$, $\eta^2 = .046$, and similar to the significant interaction for affiliation, participants viewed Mexican American targets speaking English as more dominant than the other three targets.

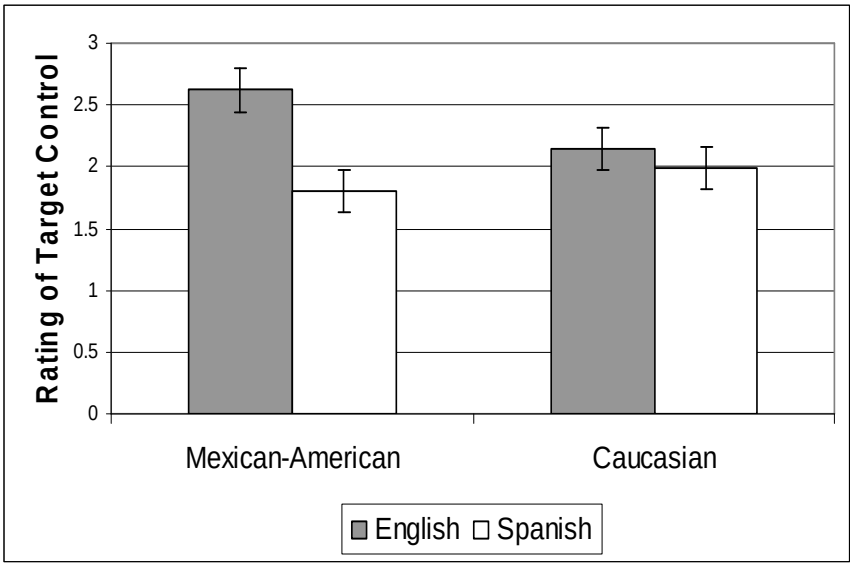

Figure 6. Rating of Target Control

Appraisals of Target Threat, Importance, and Difficulty

Means (and *SE*) for the threat, challenge, importance and task difficulty measures are presented in Table 1. Overall, participants rated themselves as being more threatened during the English speaking task than during the Spanish task (*M* = 3.45 vs. 2.83, *SE* = .153, .117, respectively), $F(1,61) = 17.15$, $p < .001$, $\eta^2 = .219$. Participants also reported greater threat when interacting with non-Hispanic White targets than with Hispanic targets (*M* = 3.39 vs. 2.89, *SE* = .162, .160, respectively, $F(1,61) = 4.76$, $p = .033$, $\eta^2 = .072$. The Task Language x Target Ethnicity interaction did not approach significance, $F(1,61) = 1.23$. Participants rated the Spanish version of the task as more challenging (i.e., greater ability to cope with the task) than the English version (*M* = 4.76 vs. 4.08, *SE* = .155, .159, respectively), $F(1,61) = 23.68$, $p < .001$, $\eta^2 = .280$. Neither the Target Ethnicity main effect on perceived challenge or the Task Language x Target Ethnicity interaction approached significance, both $F(1,61) < 1.1$. In the mixed ANOVA of the threat – challenge index (e.g., appraisal of threat - appraisal of coping ability), participants had higher values during the English version of the task than the Spanish version (*M* = 1.93 vs. .64, *SE* = .197, .257, respectively), $F(1,61) = 35.99$, $p < .001$, $\eta^2 = .371$. Neither the Target Ethnicity or the Target Ethnicity x Task Language interaction approached significance, both $F(1,61) < 1.2$).

There were no significant effects in the mixed ANOVA of task importance ratings, all $F(1,61)$ values <1.0. However, participants rated English speaking tasks as significantly more difficult than Spanish (*M* = 4.66 vs. 2.53, *SE* = .149, .119, respectively), $F(1,61) = 141.24$, $p < .001$, $\eta^2 = .698$. The main effect for Target Ethnicity approached significance $F(1,61) = 3.91$, $p = .053$, $\eta^2 = .060$, such that interacting with

Table 1.

Means and Standard Errors for Post-Task Rating Scales, for Mexican American (MA) and non-Hispanic White (nHW) Targets Speaking in English or Spanish

	English Speaking		Spanish Speaking	
Rating Scale	MA	nHW	MA	nHW
Threat	3.28 (.215)	3.61 (.218)	2.50 (.164)	3.16 (.166)
Challenge	3.91 (.223)	4.26 (.226)	4.66 (.218)	4.87 (.221)
Challenge-Threat	.63 (.36)	.65 (.37)	2.16 (.28)	1.71 (.28)
Similarity	1.97 (.103)	1.26 (.105)	2.50 (.127)	1.55 (.129)
Mexican Heritage	2.84 (.096)	1.06 (.098)	3.72 (.085)	1.13 (.086)
Difficulty	4.38 (.209)	4.94 (.212)	2.41 (.168)	2.65 (.170)
Importance	2.63 (.157)	2.73 (.169)	2.77 (.118)	2.73 (.127)

non-Hispanic White targets was rated a somewhat more difficult than interacting with other Hispanics (M = 3.79 vs. 3.39, SEs = .114, .142, respectively). The Task Language x Target Ethnicity interaction was not significant, $F(1,61) = .81$.

Appraisals of Target Similarity and Ethnic Heritage

Means (and SE) for the target similarity and ethnicity measures are also presented in Table 1. Participants identified Spanish speakers as more similar to themselves than English speaking targets (M = 2.02 vs. 1.61, SE = .091, .074, respectively), $F(1,61)$ =

24.56, $p < .001$, $\eta^2 = .914$. There was also a main effect for ethnicity, with Mexican American interaction targets viewed as more similar to participants than their non-Hispanic White counterparts ($M = 2.23$ vs. 1.40, $SE = .100, .102$, respectively), $F(1,61) = 33.68$, $p < .001$, $\eta^2 = .356$. The Target Ethnicity x Task Language interaction was not significant $F(1,61) = 2.12$, $p = .151$, $\eta^2 = .034$.

Participants rated targets speaking in Spanish as more likely to come from a Mexican background than targets speaking English ($M = 2.42$ vs. 1.97, $SE = .06, .07$, respectively), $F(1,61) = 2397.65$, $p < .001$, $\eta^2 = .975$. Participants were also more likely to identify Mexican American interaction targets as being from a Mexican background than non-Hispanic White targets ($M = 3.28$ vs. 1.10, $SE = .063, .064$, respectively), $F(1,61) = 596.93$, $p < .001$, $\eta^2 = .907$. These main effects were qualified by a significant Task Language by Target Ethnicity interaction, $F(1,61) = 18.91$, $p < .001$, $\eta^2 = .237$. As depicted in Figure 7, participants viewed Mexican American Spanish speaking targets as more likely to be from a Mexican background than Mexican American English speaking targets; non-Hispanic White targets were rated as unlikely to be of Mexican heritage, regardless of the language they spoke.

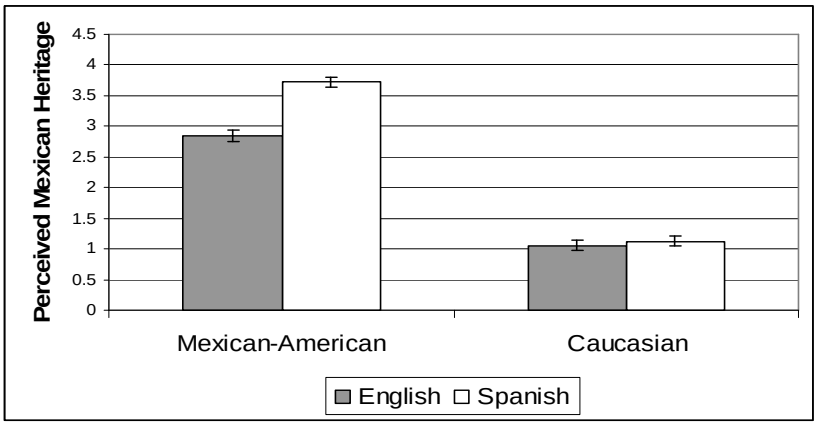

Figure 7. Perceived Mexican Heritage

Effects of Individual Differences in Acculturation and Discrimination

In the multiple regression analyses described above, higher reports of perceived lifetime discrimination predicted heightened self-reported anxiety when speaking English $\beta = .256$, $t(61) = 2.087$, $p = .041$, and Spanish $\beta = .273$, $t(61) = 2.235$, $p = .029$. There were no effects of discrimination on self-reports of anger, or responses to other post-task questionnaires. There were also no effects of any measures of acculturation with these outcomes.

There were no other significant linear or curvilinear effects of discrimination or acculturation on: resting baseline levels of SBP, DBP, or HR; task changes in SBP, DBP, or HR (for overall reactivity scores, reactivity during Spanish or English tasks considered separately, or for interactions with non-Hispanic White or Mexican American targets considered separately); or ratings of target affiliation or control. Further, there were no significant interactions of acculturation or discrimination with target ethnicity on any of these outcomes.

CHAPTER 4

DISCUSSION

The present study examined individual differences in levels of acculturation and prior discrimination, ethnicity of an interaction partner, and Spanish versus English language use as influences on CVR during stressful social interactions. Before discussing the findings, it is important to note that the tasks evoked substantial increases in negative affect, blood pressure and HR, and interaction targets were perceived as clearly unfriendly and dominant. The latter interpersonal perceptions are best described as reflecting pointed criticism (Kiesler et al., 1997; Smith et al., 2003). Hence, the procedures were successful in creating a laboratory analogue of the stressful social circumstances we intended to model.

Contrary to predictions, self-reports of prior experiences of discrimination and levels of acculturation did not predict levels of CVR or perceptions of the interaction partner. Further, these individual differences did not moderate effects of the experimentally manipulated variables of Target Ethnicity and Task Language. It is possible that the small sample size precluded appropriately powered tests of these predicted associations, although discrimination was related to self-reported anxiety in

response to the tasks. It is also possible that effects of acculturation and/or discrimination may have been apparent if more compelling, live interactions were used.

As noted previously, more highly acculturated immigrants are more likely to experience discrimination than their less acculturated counterparts (Finch et al., 2000). Therefore, the restrictions placed on sample recruitment - most notably, individuals who have immigrated to the United States and are actively engaged in learning the English language – may have been responsible for the participants' generally low levels of acculturation. This lower level of acculturation, in turn, may have influenced levels of perceived discrimination, minimizing the influence of the effects of both acculturation and discrimination in our analyses. However, it is also important to note that the literature on discrimination and CVR is somewhat inconsistent (Brondolo et al., 2009; Myers, 2009; Williams & Mohammed, 2009). The ethnicity of the interaction partner also did not influence CVR, a finding which is inconsistent with a variety of studies suggesting that interethnic social interaction is frequently stressful (Trawalter et al., 2009). Target Ethnicity was manipulated quite effectively, as non-Hispanic White targets were rated as less similar to the participants than Mexican American targets, and much less likely to be of Mexican decent. Consistent with prior research (Trawalter et al., 2009), interactions with non-Hispanic White targets were rated as more threatening. However, it is possible that use of a video-recorded interaction partner attenuated any effects on CVR and subjective responses. Additional studies of this issue among Mexican Americans are clearly needed.

Despite the generally null effects of acculturation, discrimination, and target ethnicity on CVR, language use had robust effects on CVR, emotional responses to the

task, and perceptions of the interaction partner. The patterns of results suggests that speaking English as opposed to the participants' native Spanish during the stressful task evoked substantial CVR and was experienced as clearly more unpleasant and difficult. It is important to note that these findings emerged even though the actual interaction targets were completely counterbalanced across language conditions. Hence, the effects cannot be attributed to the use of different partners. Further, the effects on CVR were observed both while participants spoke and while they observed the partner, and hence cannot be attributed to speech artifacts, such as differences in speech rate or volume. These results suggest that a common but largely understudied component of the acculturation process for many Mexican Americans – speaking English as opposed to their native Spanish – evokes a physiological response that could contribute to greater risk of CVD.

Communicating in English was rated as much more difficult than communicating in Spanish, and this factor clearly could account for the effects on CVR (Wright et al., 1995), as could the greater appraisals of threat (Blascovich & Tomaka, 1996; Smith et al., 1997). The fact that English speaking interaction partners were perceived as more controlling and less friendly suggests that differences in social features of these two languages also might be involved in this effect. Despite the fact that the same targets were used in the English and Spanish task conditions and the fact that they delivered nearly identical, carefully translated scripted remarks, targets were seen as more critical (i.e., hostile and controlling) when they spoke in English. It has been suggested that Spanish is often experienced by Mexican Americans as more polite than comparable wordings in English, perhaps because of the greater emphasis on the value of family and community relationships in the related cultural context (Youmans, 2007). Thus, in

addition to any effects of the increased difficulty of speaking in a non-native language and increased evaluative threat, this more social dimension of second language use for many Mexican Americans could contribute to some of the stressful and potentially unhealthy effects of language-related aspects of acculturation.

Qualifications and Potential Limitations

The significant effects of Task Language on CVR compared to the null effects for Target Ethnicity, discrimination, and acculturation could be seen as indicating that language is a more important influence on CVR than these other factors. However, it is important to note that as a within-participants manipulated variable, the present study provided a more sensitive test of this influence on CVR than the between-participant manipulation of Target Ethnicity and the measured factors of discrimination and acculturation. Given the paucity of similar research, each of these factors warrant additional research as potential influences on CVR and CVD risk among Mexican Americans.

Although laboratory social interactions provide important analogues for understanding the social psychophysiology of CVR, the effects of language, interaction partner ethnicity, prior discrimination, and acculturation could differ substantially in the individual's everyday environment. Hence, ambulatory studies of these factors as influences on CVR could suggest very different patterns. Also, although Language had small to moderate sized effects on CVR, the mean differences were small in absolute terms (i.e., bpm, mmHg). Although CVR is related to risk of future CVD, the health implications of the effects observed here are unclear.

These results should be generalized to other groups within the Mexican American population only with considerable caution. Effects of Language, Target Ethnicity, prior discrimination, and acculturation on CVR among Mexican American men could differ substantially from those observed here. Further, participants were primarily drawn from ESL classrooms and do not represent the wide range of Mexican American individuals acculturating to the United States. Finally, the age range was restricted, as the experience and interpretation of discrimination may differ across cohorts and various age groups (Adams & Dressler, 1988).

Conclusions and Future Directions

This study represents an initial laboratory investigation into the complex nature of language use, partner ethnicity, prior discrimination, and level of acculturation as influences on CVR during social interaction. Future research should address the limitations of the present study, as described above. Beyond such work, three of the present findings may warrant specific attention in future research. First, the health-relevant manifestations of acculturation in everyday life for many Mexican Americans may involve the effects of more difficult and stressful interactions in which they speak a non-native language. To the extent that the effects on CVR observed here are related to risk of CVD, this particular stressful exposure could contribute to the unhealthy effects of acculturation among Mexican Americans. If additional research replicates the basic effect demonstrated in the present study, other future studies should include analyses of objective and subjective language competence, the duration of efforts to acquire the new language, and the roles and contexts in which the individual engages in second-language

interactions as potential moderators and mediators of the effects of language use on CVR. The effects of language education on CVR during English language social interactions represent one avenue for research on possible interventions to reduce these effects on potentially unhealthy stress responses.

Second, the fact that the same targets were seen as less friendly and more controlling and threatening when they spoke English as opposed to Spanish, despite considerable efforts to produce similar interaction scripts, suggests that processes beyond the simple difficulty of speaking a non-native language may be involved. Some of the effect of language on CVR could involve differences in the interpersonal impacts of similar statements in the two languages, perhaps reflecting related differences in cultural values. Finally, although the effects of interacting in Spanish versus English on CVR did not differ as a function the interaction partner's ethnicity, effects of language use on perceptions of the partner did. Specifically, Mexican American targets speaking English were rated as much more unfriendly than the other three types of interaction partners, and they were seen as less likely to be of Mexican origin. This suggests that variations in experiences within the Mexican American community that are related to acculturation and language may also be useful topics for future research on health-relevant aspects of minority ethnic status.

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